

WHAT IS CLAIMED IS:

1 1. A surge protection device, of the type including a gas discharge tube surge
2 protector connected between a Tip line and a Ring line, wherein the improvement
3 comprises:

4 a first thermally-responsive sneak current-grounding switch in the Tip line;
5 a second thermally-responsive sneak current-grounding switch in the Ring
6 line;

7 a first solid state heat-generating resistive element connected in the Tip line in
8 series with the first sneak current-grounding switch;

9 a second solid state heat-generating resistive element connected in the Ring
10 line in series with the second sneak current-grounding switch;

11 a first surge suppression element connected in the Tip line in parallel with the
12 first heat-generating resistive element; and

13 a second surge suppression element connected in the Ring line in parallel with
14 the second heat-generating resistive element.

1 2. The surge protection device of claim 1, wherein the gas discharge tube
2 surge protector has a Tip line terminal and a Ring line terminal, and wherein the first
3 sneak current-grounding switch has an untripped position in which the Tip line
4 terminal is connected to the first solid state heat-generating element, and a tripped
5 position in which the Tip line terminal is grounded; and

6 wherein the second sneak current-grounding switch has an untripped position
7 in which the Ring line terminal is connected to the second solid state heat-generating
8 element, and a tripped position in which the Ring line terminal is grounded.

1 3. The surge protection device of claim 2, wherein the first and second sneak
2 current grounding switches are switched from their untripped position to their
3 tripped position in response to ohmic heating of the first and second solid state heat-
4 generating resistive elements as a consequence of a current passing through the
5 resistive elements that exceeds a predetermined current level.

1 4. The surge protection device of claim 1, wherein the first and second heat-
2 generating resistive elements are carbon film resistors.

1 5. The surge protection device of claim 1, wherein the first and second surge
2 suppression elements are bipolar transient voltage suppression diodes.

1 6. The surge protection device of claim 2, wherein the first and second surge
2 suppression elements are diodes having a clamping voltage that is within a range in
3 which the diodes remain non-conductive when the current through the resistive
4 elements is at or below the predetermined current level, and in which the diodes
5 protect the resistive elements from expected voltage surges.

1 7. The surge protection device of claim 6, wherein the first and second surge
2 suppression elements are bipolar transient voltage suppression diodes.

1 8. The surge protection device of claim 6, wherein the clamping voltage is in
2 the range of about 10V to about 17V.

1 9. A surge protection device, of the type including a gas discharge tube surge
2 protector connected between a Tip line and a Ring line, wherein the gas discharge
3 tube surge protector has a Tip line terminal and a Ring line terminal, and wherein the
4 improvement comprises:

5 a first solid state heat-generating resistive element in the Tip line that exhibits
6 ohmic heating in response to current passing through it;

7 a first thermally-responsive sneak current grounding switch having an
8 untripped position in which it connects the Tip line terminal to the first resistive
9 element, and a tripped position in which it connects the Tip line terminal to ground;
10 a first solid state heat-generating resistive element in the Tip line that exhibits
11 ohmic heating in response to current passing through it;
12 a second thermally-responsive sneak current grounding switch having an
13 untripped position in which it connects the Ring line terminal to the second resistive
14 element, and a tripped position in which it connects the Ring line terminal to ground;
15 a first surge suppression element connected in the Tip line in parallel with the
16 first heat-generating resistive element; and
17 a second surge suppression element connected in the Ring line in parallel with
18 the second heat-generating resistive element;
19 wherein the first and second sneak current grounding switches are switched
20 from their untripped position to their tripped position in response to ohmic heating of
21 the first and second solid state heat-generating resistive elements as a consequence of
22 a current passing through the resistive elements that exceeds a predetermined current
23 level.

1 10. The surge protection device of claim 9, wherein the first and second heat-
2 generating resistive elements are carbon film resistors.

1 11. The surge protection device of claim 9, wherein the first and second surge
2 suppression elements are bipolar transient voltage suppression diodes.

1 12. The surge protection device of claim 9, wherein the first and second surge
2 suppression elements are diodes having a clamping voltage that is within a range in
3 which the diodes remain non-conductive when the current through the resistive
4 elements is at or below the predetermined current level, and in which the diodes
5 protect the resistive elements from expected voltage surges.

1 13. The surge protection device of claim 12, wherein the first and second
2 surge suppression elements are bipolar transient voltage suppression diodes.

1 14. The surge protection device of claim 12, wherein the clamping voltage is
2 in the range of about 10V to about 17V.
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